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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G06K — A2

(11) International Publication Number: WO 98/37506

(43) International Publication Date: 27 August 1998 (27.08.98)

(21) International Application Number: PCT/US98/02572

(22) International Filing Date: 10 February 1998 (10.02.98)

(30) Priority Data:
60/037,874 10 February 1997 (10.02.97) US

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(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: TOUCH PAD WITH SCROLL BAR, COMMAND BAR

(57) Abstract

A method for improving the productivity and useability of a graphical user interface by employing various methods to switch between different cursors which perform different types of functions. The invention exploits the absolute and relative positioning capabilities of certain types of pointing devices to improve the productivity and useability of various types of graphical user interfaces. The invention provides a method for using a gesture, motion or initial position with a pointing device to select a function, followed by a subsequent motion which is used to select a value.

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TOUCH PAD WITH SCROLL BAR, COMMAND BAR

BACKGROUND OF THE INVENTION

Many popular computer applications use a pointing device, controlling the movement of cursor, to perform functions, as an alternative to using keyboard commands. Examples include wordprocessors, spreadsheets and drawing programs. In a wordprocessor, for example, the pointing device can make it a lot easier to learn and use various functions. The pointing device, in conjunction with a displayed cursor, can, for example, visually select a portion of text, then pull down a command menu and select a function such as cut, copy or paste. This is desirable for many users rather than using long typed commands, or short typed command abbreviations. Long commands take a long time to type, especially for inexpert typists, and both long commands and short command abbreviations may be hard to remember.

For these and other reasons, the graphical user interface (GUI), using a pointing device such as a mouse, trackball or joystick, has become the user interface of choice for the vast majority of applications in use today.

However, this interface is not optimum, and can be improved upon. Let's look at the GUI for a wordprocessor. In the body of text, typical functions include selecting a portion of text to be cut or copied, or positioning a cursor to mark an insertion point for text. In all these cases, the cursor must be positioned between two characters, which requires considerable accuracy. The best way to get such accuracy is to have low positional gain (sometimes known as "tracking speed"). This means that a large motion of the pointing device will result in a relatively small motion of the cursor. This makes it easy to move with accuracy over small distances, but has the consequences that it is more difficult to move the cursor over large distances.

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The act of accurately positioning the cursor is frequently interspersed with actions which select a command or function to be performed. For example, a typical sequence is select text, select "cut" command, position cursor at insertion point, select "paste" command. This sequence involves three between-character positions, requiring accuracy, interspersed with the command selections, which require rapid movement over long distances to hit large targets (commands the size of whole words rather than spaces between characters).

It is easiest to select a command when there is high positional gain (tracking speed) on the pointing device. The cursor moves a lot for a small movement of the pointing device, so it is quick to move across the screen to a command menu, and pull down and select the desired command. Because the command is a large target, it is easy to hit, even with a high gain cursor.

Therefore there is a desire for two different types of response of the cursor to the pointing device, and we want to switch rapidly between them. Therefore, if we are to switch between cursor responses (gain levels), we should be able to do so quickly and easily, or else the advantage of switching between responses will be outweighed by the time it takes to make the switch.

This is one of the primary reasons for the enduring popularity of the mouse as a pointing device. The mouse offers an effectively seamless switch between low and high positional gains. For accurate control, the mouse is moved with the fingers, while anchoring the hand in place with the heel of the hand on the desktop. For large movements, the mouse is moved from the shoulder and elbow, exploiting the space on the desktop.

However, even this capability of the mouse can be improved upon. In situations where it is not practical to use a mouse, the need for a solution is even more compelling.

A number of different patents disclose touchpads in which a different response is provided depending upon what area of the touchpad is touched, such as the border area in

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particular. Microtouch Systems U.S. Patent No. 5,327,161 discloses a cursor which continues to move when the border area is reached. U.S. Patent No. 4,935,728 shows a fine response to a finger movement in the middle of a touchpad, and a coarse response near the edge.

SUMMARY OF THE INVENTION

The invention provides a method for improving the productivity and useability of a graphical user interface by employing various methods to switch between different cursors which perform different types of functions. The invention exploits the absolute and relative positioning capabilities of certain types of pointing devices to improve the productivity and useability of various types of graphical user interfaces. The invention provides a method for using a gesture, motion or initial position with a pointing device to select a function, followed by a subsequent motion which is used to select a value.

A particular embodiment and application for this invention is a touchpad integrated pointing device which works in the usual relative mode on the majority of the touchpad surface, but has special functions when finger touches down in border regions of the pad. For example, if the finger touches in the upper border region, the cursor immediately goes to the command bar. If the finger touches down in the right border, the cursor immediately goes to the scroll bar. In both of these cases, the cursor returns to its original position whenever the finger again touches down anywhere that is not one of the border regions. This example increases user productivity by allowing the frequently used large cursor movements to be quickly executed in spite of the small area of the pointing devices, thus allowing the "ballistics" to be set for low tracking speed which gives good accuracy.

For a further understanding of the nature and advantages of the invention, reference should be made to the following description taken in conjunction with the accompanying drawing.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram illustrating the touchpad zones according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Rather than use some mechanism to effectively achieve variable positional gain (tracking speed), it may be better in many applications to recognize that the need for high gain is in situations where the destination is a specific zone of the GUI display, such as the command bar or the scroll bar. GUIs often put command bars at the top and bottom of the display, while forms of scroll bar are at the right and sometimes left of the display.

The general principle of the invention is to use some feature of the pointing device to indicate that a certain zone of the screen is desired so that the cursor jumps immediately to that zone eliminating the need for large controlled movement. Once in the zone, the pointing device is used in the traditional mode, either absolute or relative.

The gain or tracking speed may be automatically set as appropriate for that zone, for example it may be larger in the command bar so as to quickly select commands (which are large targets and so need less accuracy).

A similar indication returns the cursor to its original zone, and in many applications it will return the cursor to its original position.

Another principle of the invention is that once the indicated zone is entered, then the selected function may be continued even though the cursor is moved into a different zone. For example, the command bar may be selected, but when a menu is pulled down (or popped up) the cursor enters the main body of the display, but is still functioning as part of the command zone.

TouchPad and Pen Pad Embodiments

A TouchPad provides more information to the computer than an existing mouse can. First, the pad knows whether the finger is touching the pad or not regardless of whether it is moving.

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Second, the pad knows where the finger is touching in absolute terms relative to the boundaries of the pad, which a mouse does not. The pad can report motion as both relative and absolute.

This later information is the basis of the invention as implemented with a touchpad. Here are some examples:

1) Integrated Pointing Device (IPD) for portable computing devices

A TouchPad makes an excellent pointing device for portable computers, because of ease-of-use, durability, cost and thinness.

Different physical areas of the touchpad may designated as touchdown areas. If the finger slides into such an area from another area then there is no effect. But if the finger touches down in such an area, a special function is indicated, such as jumping the cursor into a new zone (which is the same as selecting a different cursor if there are multiple cursors).

For example, the top and bottom border areas can indicate command bars (pull-down menus and pop-up menus), while the right border can indicate a scroll bar. There are various ways of implementing the details of this. Variations on these examples will be obvious to those skilled in the art.

For example, where the command bar has a single row of pulldown menus, the finger is touched down near the upper border of the pad. This will position the cursor in the command bar with positioning now absolute (top of screen is mapped to top of pad). The user slides the finger left and right to select the desired pulldown menu, then slides the finger down to pull down the menu and select a command. The finger is released when the command is highlighted which activates the command.

When there are multiple rows of menus or commands in the command bar, the desired menu or command is selected by left, right up and down movements. One method of activating a command or menu is by tapping a second finger on the pad once the command is selected or placing a second finger on the pad

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to pull down a selected menu. Both fingers can be dragged down and released when the desired menu command is highlighted.

In the case of scroll bars, one implementation is to position the cursor inside the scroll box whenever the finger touches down in the right border area. When the finger is dragged up or down the scroll box moves, and the scrolling is activated when the finger is released. The upper right and lower corner of the pad can be used for page up and page down.

All of the above pad examples are equally applicable to pen pads.

The touchpad can be visually coded to indicate the special function zones, for example lines or a different color. This encoding could be tactile, with ridges indicating the zones.

Figure 1 illustrates a touch screen 10 having different areas according to one embodiment of the present invention. A central zone 12 is a normal pointing zone in which the cursor responds to the position of the finger. Upper and lower zones 14 and 16 can act command bars, with the cursor jumping to a command bar on the screen of the display when the finger touches down in these zones. Similarly, a scrolling zone 18 brings the cursor to the scroll bar on a screen, when a finger touches down in this zone. Preferably, as discussed above the finger must first be lifted and then placed within any of zones 14, 16 and 18 to provide the response. If the finger continuously moves into such an area, the cursor will simply continue moving along with the finger. Page up and Page down areas 20 and 22 are also shown, as discussed above. In an alternate embodiment, instead of portions of the screen being designated, a touch sensitive border strip could be place on a bezel around the touch screen. When this bezel is touched, the appropriate command bar or scroll bar could be activated.

2. Large Size Pad (Touch/Pen) For Use on Desk, Lap, Wall, Instrument Panel, etc.

This kind of pad could be any size, but will typically be larger than a credit card and as large as a full size sheet of

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paper. For the large pad, all of the functions of the small pad, as above, are applicable.

In addition, the larger area can be exploited further in the context of the invention. Multiple areas can be designated as touchdown points (or buttons) The absolute positioning nature of a pen tablet or touchscreen has been used before to provide button functions. However, this invention allows the finger (or pen) to slide outside the button area while maintaining the button function. Thus the button may enable a pointing function in a specific mode. The pointing function could continue in relative mode from an existing cursor position. Or finger motion could be used to adjust a value, such as brightness, color, or audible volume. The value adjustment could be one or two dimensional, such as up/down indicating volume and left/right indicating balance. For one dimensional adjustments, the button zone on the physical pad can be rectangular, implying a slide switch. In either the one or two dimensional case, and advantage is that once the finger is touched down in the button area, it does not have to stay in that area while adjusting the value, which enhances ease-of-use.

The different touchdown zones can be indicated on the display screen, or can be marked (visual or tactile) permanently on the pad, or can be marked on the pad with a removable overlay.

Chording on the Mouse.

The same principle can be used to enhance the useability of a mouse. One way to do this is to use a "chord" (as in a chord played on a piano) played on the mouse buttons.

For example, if the middle and right buttons are held down simultaneously, the cursor will jump into the scroll bar, while if the left and right buttons are held down, the cursor could jump into the command bar, in much the same way as the border areas would select a zone in the pad examples above. Once the command zone is selected, the mouse can be moved left and right to select a menu, and down to pull it down and select a command, and released to activate the command.

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There are many variations on this theme that will be obvious once the general concept is understood. For example, once a chord of two buttons (on a three button mouse) is played (buttons held down), then the unused button can be used as a drag or activation function.

As will be understood by those of skill in the art, the present invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. Accordingly, the foregoing description is intended to be illustrative, but not limiting, of the scope of the invention which is set forth in the following claims.

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WHAT IS CLAIMED IS:

1. A touchpad comprising:

a touchpad having a central region and at least one border region;

a circuit for detecting a touch in said central region and in said border region;

a controller, responsive to a detected touch, for activating a different cursor function for a touch in said border region compared to a touch in said central region.

2. The touchpad of claim 1 wherein said different cursor function is a scrolling cursor.

3. The touchpad of claim 2 wherein said border region is a side border of said touchpad.

4. The touchpad of claim 1 wherein one border region is a top of said touchpad, and said different cursor function is a command bar.

5. The touchpad of claim 1 wherein said different cursor function in said border region is only activated for a separate touchdown in said border region, and not for a touch sliding into said border region.

6. The touchpad of claim 1 wherein said different cursor function is a different zone of a display.

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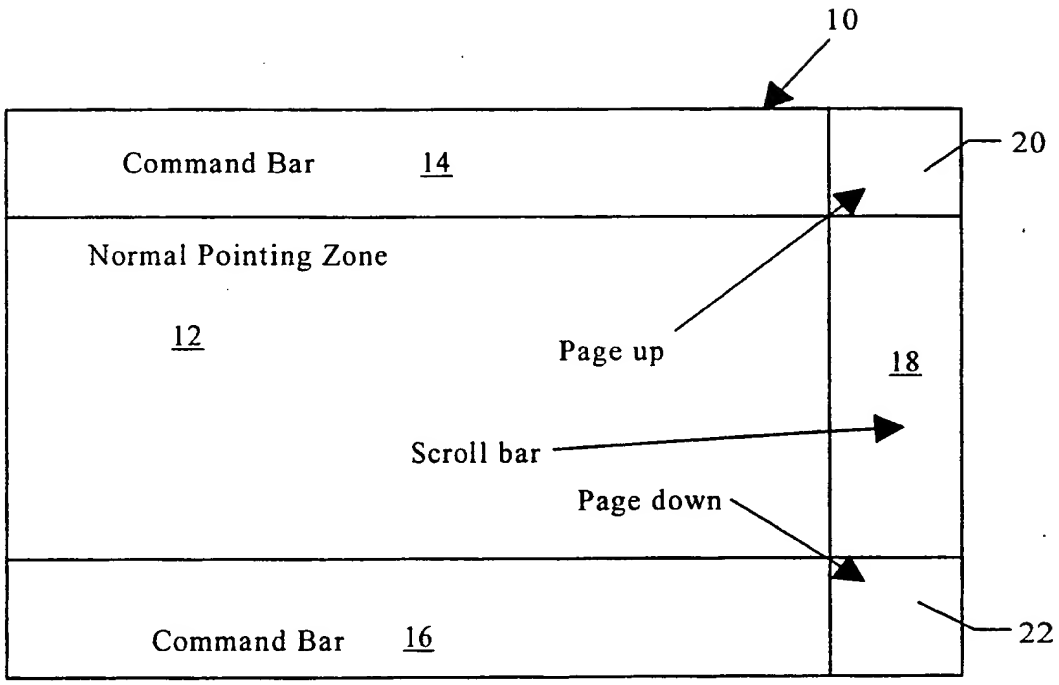

FIG. 1

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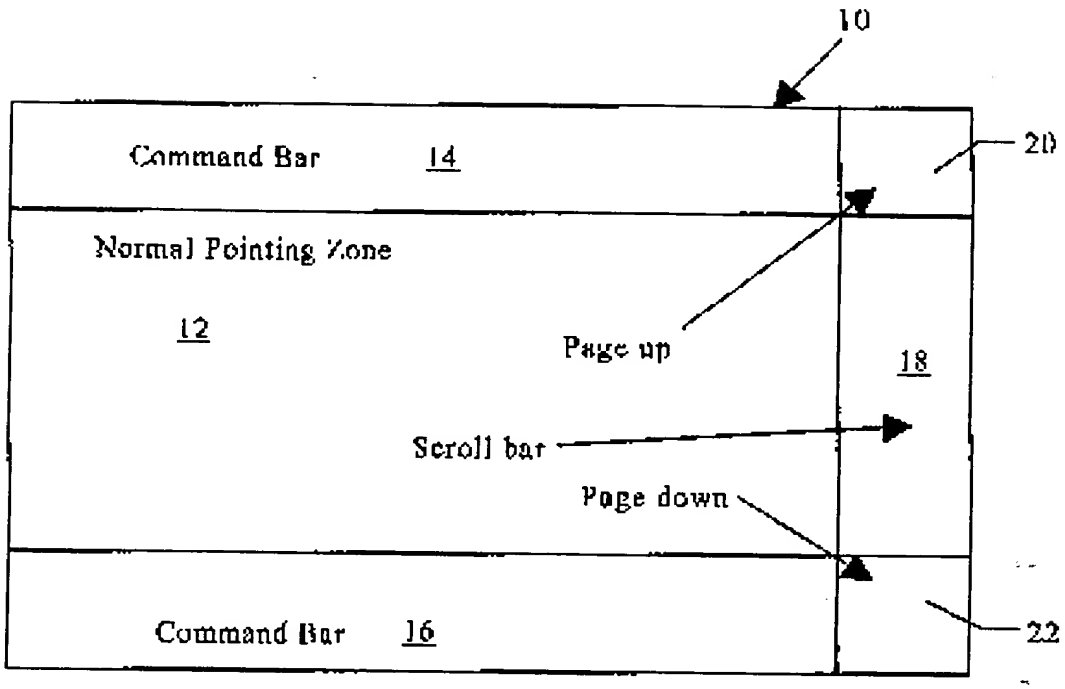

FIG. 1

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(51) International Patent Classification 6 : G09G 5/00 | A3

(11) International Publication Number: WO 98/37506

(43) International Publication Date: 27 August 1998 (27.08.98)

(21) International Application Number: PCT/US98/02572

(22) International Filing Date: 10 February 1998 (10.02.98)

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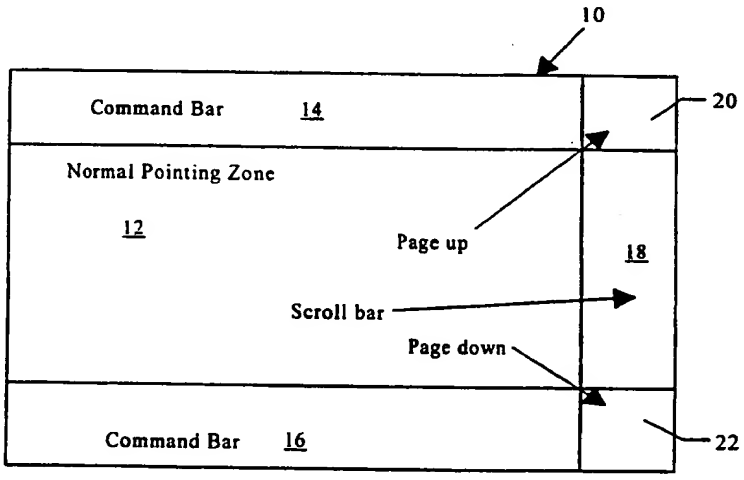
Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(88) Date of publication of the international search report:
10 December 1998 (10.12.98)

(54) Title: TOUCH PAD WITH SCROLL BAR, COMMAND BAR



(57) Abstract

A method for improving the productivity and useability of a graphical user interface by employing various methods to switch between different cursors which perform different types of functions (12, 14, 16, 18, 20, 22). The invention exploits the absolute and relative positioning capabilities of certain types of p inting devices to improve the productivity and useability of various types of graphical user interfaces. The invention pr vides a method for using a gesture, moti n or initial position with a pointing device to select a function, followed by a subsequent moti n which is used t select a value.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/02572

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G09G 5/00
US CL : 345/173

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APS - TOUCHPAD, CURSOR, FUNCTION AREA, POSITION, SELECT , MENU

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,340,061 A (VAQUIER ET AL.) 23 AUGUST 1994, Col 3, Lines 1-15, Col 4, Lines 24-67, Fig 1.	1-6
A	US 5,327,161 A (LOGAN ET AL) 05 JULY 1994, Col 3, Lines 3-63.	1
A	US 5,469,194 A (CLARK ET AL) 21 NOVEMBER 1995, Col. 4, Lines 1-65.	1
A	US 5,543,591 A (GILLESPIE ET AL) 06 AUGUST 1996, Col. 8, Lines 58-67; Col. 9, Lines 1-7; Col. 11, Lines 7-20.	1
A	US 4,862,151 A (GRAUZ ET AL) 29 AUGUST 1989, Col. 2, Lines 40-65; Col. 3 , Lines 1-40.	1

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Date of the actual completion of the international search

15 APRIL 1998

Date of mailing of the international search report

22 OCT 1998

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